Application of PALSAR Data for Agricultural Managements (Understanding for each and integrated ecosystem using remote sensing, 6th International Symposium on Integrated Field Science)

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INTRODUCTION

In agriculture, the change of the ground surface is rapidly and more dynamic compared with the forest that treats vegetation too. Major farm products are harvested at half a year from several months. Therefore, it is important that "Timely" and " Periodic" observations be done in agriculture. In optical sensor, because it is influenced by the weather, "timely" observation is difficult. SAR is expected "Timely" observation.

Rice is staple food of Asia, and monitoring the area of rice is demanded. Until now, the rice paddy fields have been observed by L-band SAR such as AIRSAR, JERS-1, Pi-SAR, and SIR. However, a "Periodic" observation by multi polarimetric L-band SAR is not done. The purpose of the research is to clarify the problem and effectiveness when measure the planted acreage of rice paddy fields in the large area using ALOS/PALSAR, which is the first in the world L-band multi polarimetric satellite SAR sensor.

RESULTS

Fig.1 shows the image of PALSAR (HH) observed in 11 May 2007. In this time, almost paddy fields are finished puddling and leveling, transplanting of rice. A dark part is seen from the north to the south like the stripe at the left of figure. It is a paddy field zone, and specular reflections have happened most in rice paddy fields. It is known well to look dark in the SAR image that the microwave cause the specular reflection where water area. On the other hand, the parts which look bright white are an urban area or forest area.

However, the all parts that appear dark circled in Fig. 1 is not rice paddy fields. The area has a lot of turf fields. Therefore, a waterless field looks dark. Those are not able to distinguish with the water.

The reason for this is that PALSAR is SAR of L band. The PALSAR of L band SAR is considered smooth even if the roughness somewhat grows compared with RADARSAT etc. of C band SAR sensor. Therefore, those turf fields are not so difference with fields filled water, look dark, occur the specular reflection, backscatter is weak.

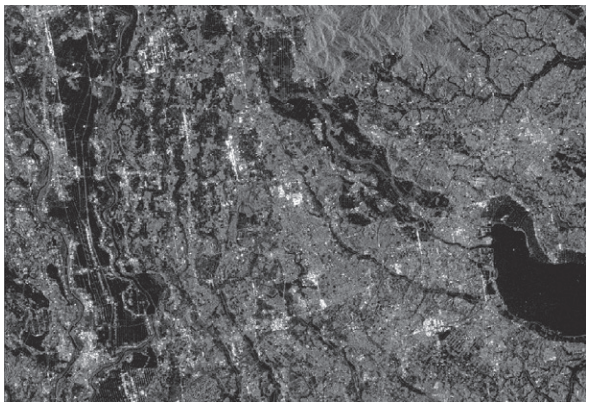

Fig. 1. PALSAR Image (11 May 2007)

I have similar results another area. it is difficult to distinguish with filled water, puddling and leveling fields, wheat fields clearly from the difference of backscatter value in the PALSAR image.

Next, I compare with growth of rice and backscatter value in the temporal PALSAR image. Fig.2 shows time series change of backscatter(dB) in HH PALSAR images and height of rice. As a result, I conclude that it is difficult to evaluate growth of rice clearly from the difference of backscatter value in the PALSAR image.

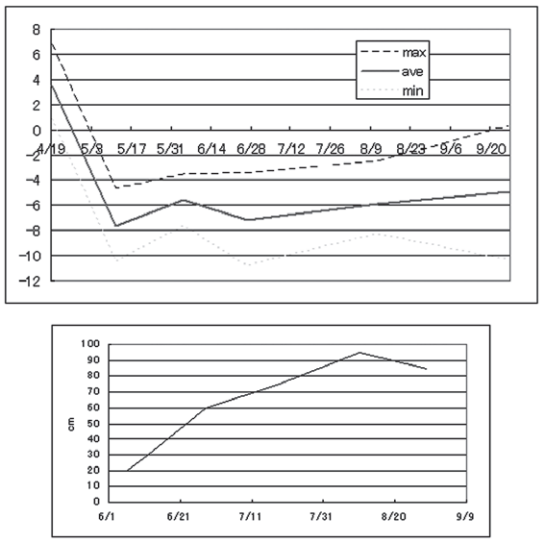

Fig. 2. Time series change of backscatter (upper) and height of rice (lower).

CONCLUSIONS

There are some study of rice paddy fields using SAR. Those are mostly use RADARSAT that is C-band sensor. If using L-band SAR, the scattering of paddy fields is different C-band SAR, and directly use same method to monitor rice paddy fields. In this time, I conclude that it is difficult to distinguish filled water, growing of rice, and some other fields clearly from the difference of backscatter value in the PALSAR image. However, we consider that it is possible to classify though it is a difficult to distinguish state of the ground in this time if PALSAR combines with the SAR image with different wavelength or the optical sensor image. In addition, it is necessary to consider also about the change done by the difference of the incidence angle. I plan to keep experimenting on the microwave-scattered characteristic in the farmland.